REMARKS

Claims 1-31 are pending in the present application. In the Office Action mailed March 3, 2006, the Examiner rejected claims 16, 17, 23, and 24 under 35 U.S.C. §102(b) as being anticipated by Civil et al (GR 2,255,645A). The Examiner next rejected claims 25, 29, and 30 under 35 U.S.C. §102(b) as being anticipated by Lienhard et al (USP 4,464,625). Claims 1-4, 9, 15 and 31 were rejected under 35 U.S.C. §102(b) as being anticipated by Lienhard et al.

Applicants acknowledge and appreciate the Examiner's rejoinder of group II into group I, with the alleged species of figure 4, alleged species of figure 6, and alleged species of figure 8 being still valid in group I.

The Examiner withdrew claims 10-13 and 26-28 from further consideration, stating the "[e]lection was made **without** traverse in the reply filed on 02/09/06." *Office Action, Page 2, Paragraph 2.* Applicants respectfully disagree with the Examiner and direct Examiner's attention to the "Response to January 10, 2006 Restriction Requirement" wherein the Applicants elected, with traverse (underline in original) what the Examiner has characterized as "Invention I." Applicants further elected the species of Fig. 6 under that traversal.

The Examiner objected to the title of the invention as not descriptive. An amended title is submitted that is indicative of the invention to which the claims are directed.

The Examiner objected to the abstract of the disclosure because it allegedly contained "legal phraseology." An amended abstract is hereby submitted.

Claims 1-9, 14, 15, 22 and 23 were objected to because of informalities.

The Examiner stated, regarding claim 1, that it is unclear what "a conductor" comprises of. Claim 1 has been amended to indicate how "a conductor" is interrelated and associated with the elected species of figure 6.

Regarding claim 9, the Examiner stated, that it is "unclear how the conductor is interrelated with the helix shaped flux concentrator." The amendment to claim 1 also clarifies this objection to Claim 9.

The Examiner stated, regarding claim 22, that it is "unclear what are the requirements to select first and second Hall effect sensors in order to reduce errors attributable to Hall gain drift and Lorentz force." Applicants direct the Examiner's attention to Paragraph 57 of the disclosure, where it is stated:

> Further advantages are gained by matching the Hall effect sensors. That is, if properly matched, the system is substantially free of errors due to zero flux offsets and Hall effect gain differences. Furthermore, matching the Hall effect

sensors substantially corrects zero flux offset drift associated with temperature fluctuations.

As called for, preferably, the Hall effect sensors can be matched to reduce errors. Accordingly, Applicants believe that claim 22 as originally submitted is in condition for allowance.

The Examiner objected to "the second Hall effect device" in claim 23. Claim 23 has accordingly been amended.

Applicants have amended 8, 9, 14, and 15 to change the preamble from "[t]he current sensor" to "[t]he current sensing system."

The Examiner has rejected claims 16-17, 23 24 under 35 U.S.C. §102(b) as being anticipated by Civil et al. Applicants respectfully submit that the reference does not teach or suggest one or more elements of the claimed invention. Claim 16 calls for a current sensor comprising at least one spiraled-helix conductive path configured to receive a current flow therethrough and concentrate magnetic flux induced by the current flow through the at least one spiraled-helix conductive path, and at least one Hall effect sensor positioned proximate to the at least one spiraled-helix conductive path and configured to sense the concentrated magnetic flux and provide a signal indication of the current flow through the at least one spiraled-helix conductive path.

The Examiner asserts that Civil et al discloses a current sensor as shown in figure 1 having at least one spiraled helix conductive path (8) configured to receive a current flow therethrough and concentrate magnetic flux induced by the current flow through the at least one spiraled helix conductive path (8) and at least one Hall effect sensor (4) positioned proximate to the at least one spiraled helix conductive path (8) configured to sense the magnetic flux and provide a signal indication of the current flow through the spiraled helix conductive path (8).

Applicants respectfully disagree with the assertion that the configuration of the conductive path is a "spiraled helix." Civil et al. discloses "[a] Hall effect device (4) formed in or on the surface of a silicon substrate (6) of an integrated circuit. A coil (8) is formed by laying an electrically conductive metal track about the device (4)." *Civil et al., P.3 last paragraph.* Civil et al. does not disclose nor suggest a "spiraled helix conductive path" as asserted by the Examiner.

If the Examiner has concluded that a "spiraled helix conductive path" is the equivalent of the coil described by Civil et al., Applicants affirmatively traverse such a conclusion. "Helix" is a widely recognized mathematical term defined as "a three dimensional curve that lies on a cylinder or cone, so that its angle to a plane perpendicular to the axis is constant." WWW.DICTIONARY.COM, *citing* The American Heritage Dictionary of the English Language,

Fourth Edition, 2000 (copy enclosed). Helix is generally understood, and specifically defined, to mean a three dimensional curve, and not the coil described by Civil et al. that is formed "on the surface of a silicon substrate." The definition of "helix" above comports with Applicants' invention as disclosed in Figure 6. Figure 6 clearly shows a helix as described above, and from this figure and definition, it is clear that Civil et al. neither teaches nor suggests that called for in claim 16.

Accordingly, that which is called for in claim 16 is not shown, disclosed, taught, or suggested in the art of record. As such, Applicants believes claim 16, and the claims which depend therefrom, are patentably distinct over the art of record.

The Examiner has rejected claims 25, 29-30 under 35 U.S.C. §102(b) as being anticipated by Lienhard et al. Applicants respectfully submit that the reference does not teach or suggest one or more elements of the claimed invention. Claim 25 calls for a conductor configured to receive a current flow, an anti-differential current sensor configured to monitor the current flow through the conductor, and wherein the conductor is arranged according to a helix topology.

The Examiner asserts that Lienhard et al discloses a current sensor as shown in figure 3 having a conductor (9) configured to receive a current flow (Im) and an anti-differential current sensor (10) configured to monitor the current flow through the conductor (9). Examiner further notes that conductor (9) is allegedly arranged according to a helix topology.

While Lienhard et al. shows a current sensor having a conductor configured to receive a current flow, Lienhard et al. does not disclose an anti-differential current sensor as claimed by Applicants. The difference amplifier (10) of Lienhard, et al. is "advantageously postcoupled to the Wheatstone bridge (5), which amplifier has a constant amplification factor and amplifies the bridge output voltage Ub by a factor suitable to be measured or indicated." *Lienhard et al., Col. 4, lines 2-5.* The operation of the difference amplifier (10) is not that of an anti-differential sensor configuration as disclosed by Applicants. Specifically, the anti-differential current sensor configuration as disclosed by Applicants "provides an anti-differential output that is a highly accurate indication of the current flow through the conductor and is substantially free of influence of externally induced magnetic fields." *Application, Paragraph 34.* The anti-differential current sensor of the present invention is configured "with opposing Hall effect sensors H1, H2 disposed about the periphery of the conductor." *Application, Paragraph 35.* Furthermore, even though the directions of magnetic flux B1 are substantially opposite in direction, both Hall effect sensors provide positive feedback "+IB1." Finally, upon detecting stray or foreign magnetic field B2, the Hall effect sensors provide equal and opposite feedback. *Application, Paragraph 38.*

Lienhard et al. merely states that "difference amplifier (10) is advantageously postcoupled to the Wheatstone bridge (5), which amplifier has a constant amplification factor and amplifies the bridge output voltage Ub by a factor suitable to be measured or indicated. The difference amplifier (10) also isolates the output circuit thereof from the bridge circuit." *Lienhard et al., Col. 4, lines 2-5.* Clearly, the difference amplifier as disclosed in Lienhard et al. is not that of an anti-differential configuration as claimed by Applicants.

Accordingly, that which is called for in claim 25 is not shown, disclosed, taught, or suggested in the art of record. As such, Applicants believe claim 25, and the claims which depend therefrom, are patentably distinct over the art of record.

The Examiner has rejected claims 1-4, 9, 15 and 31 under 35 U.S.C. §102(b) as being anticipated by Lienhard et al. Applicants respectfully submit that the reference does not teach or suggest one or more elements of the claimed invention. Claim 1 calls for, in part, a conductor configured to receive current flow therethrough and generate magnetic flux thereabout, flux concentrator with the conductor further configured in a helix shape to concentrate magnetic flux induced by current flow through the conductor, and an anti-differential current sensor configured to monitor magnetic flux about the flux concentrator.

Claim 31 calls for a method of making a flux concentrating current sensor system comprising configuring a conductive path to form a helix-shaped flux concentrating means to concentrate magnetic fields, disposing a pair of ferromagnetic-free current sensors in proximity to the flux concentrating means to detect the concentrated magnetic fields, and configuring an anti-differential calculator to receive feedback from the pair of ferromagnetic-free current sensors and generate an indication of current flow through the conductive path that is substantially free of errors due to magnetic fields generated externally from the conductive path impinging upon the pair ferromagnetic-free current sensors.

The Examiner asserts that Lienhard et al. discloses a current sensor as shown in figure 3 having a conductor (9) configured to receive a current flow (Im) and an anti-differential current sensor (10) configured to monitor the current flow through the conductor (9). The Examiner further alleges that conductor (9) of Lienhard et al. is arranged according to a helix topology.

While Applicants do not disagree that Lienhard et al. disclose a current sensor having a conductor configured to receive a current flow, Applicants respectfully disagree with the assertion of the Examiner that current sensor (10) is an anti-differential current sensor as disclosed and claimed by Applicants. The difference amplifier (10) of Lienhard et al. is "advantageously postcoupled to the Wheatstone bridge (5), which amplifier has a constant

amplification factor and amplifies the bridge output voltage Ub by a factor suitable to be measured or indicated." *Lienhard et al., Col. 4, lines 2-5.* Again, clearly, the difference amplifier as disclosed in Lienhard et al. is not that of an anti-differential configuration as claimed by Applicants.

Accordingly, that which is called for in claims 1 and 31 is not shown, disclosed, taught, or suggested in the art of record. As such, Applicants believe claims 1 and 31, and the claims which depend therefrom, are patentably distinct over the art of record. Applicants respectfully request withdrawal of the §§ 102 rejection of claims 1 and 31.

Therefore, in light of at least the foregoing, Applicants respectfully believe that the present application is in condition for allowance. As a result, Applicants respectfully request timely issuance of a Notice of Allowance for claims 1-9, 14-25, and 29-31.

Applicants appreciate the Examiner's consideration of these Amendments and Remarks and cordially invites the Examiner to call the undersigned, should the Examiner consider any matters unresolved.

Respectfully submitted,

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[1]The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 50-2623. Should no proper payment be enclosed herewith, as by credit card authorization being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 50-2623. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extensions under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 50-2623. Please consider this a general authorization to charge any fee that is due in this case, if not otherwise timely paid, to Deposit Account No. 50-2623.

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7 entries found for *helix*.

he·lix Pronunciation Key (hē'lĭks)
n. pl. **he·lix·es** or **hel·i·ces** (hĕl'ĭ-sēz', hē'lĭ-)

1. *Mathematics.* A three-dimensional curve that lies on a cylinder or cone, so that its angle to a plane perpendicular to the axis is constant.
2. A spiral form or structure.
3. *Anatomy.* The folded rim of skin and cartilage around most of the outer ear.
4. *Architecture.* A volute on a Corinthian or Ionic capital.

[Latin, from Greek. See wel-[2] in Indo-European Roots.]

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Source: *The American Heritage® Dictionary of the English Language, Fourth Edition*

he·lix (hē'lĭks)
n. pl. **he·lix·es** or **hel·i·ces** (hĕl'ĭ-sēz', hē'lĭ-)

1. A spiral form or structure.
2. The folded rim of skin and cartilage around most of the outer ear.
3. A three-dimensional curve that lies on a cylinder or cone, so that its angle to a plane perpendicular to the axis is constant.

Source: *The American Heritage® Stedman's Medical Dictionary Copyright © 2002, 2001, 1995 by Houghton Mifflin Company. Published by Houghton Mifflin Company.*

Main Entry: **he·lix**
Pronunciation: 'hE-liks
Function: *noun*
Inflected Form: *plural* **he·li·ces** /'hel-&-"sEz, 'hE-l&-/ *also* **he·lix·es** /'hE-lik-s&z/
1 : the incurved rim of the external ear
2 : a curve traced on a cylinder by the rotation of a point crossing its right sections at a constant oblique angle; *broadly* : SPIRAL 2 —see ALPHA-HELIX DOUBLE HELIX

Source: *Merriam-Webster's Medical Dictionary, © 2002 Merriam-Webster, Inc.*

helix

n 1: a curve that lies on the surface of a cylinder or cone and cuts the element at a constant angle [syn: spiral] 2: a structure consisting of something wound in a continuous series of loops; "a coil of rope" [syn: coil, spiral, volute, whorl] 3: type genus of the family Helicidae [syn: Helix, genus Helix]

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helix

A hardware description language from Silvar-Lisco.

Source: *The Free On-line Dictionary of Computing, © 1993-2005 Denis Howe*

helix, OR (city, FIPS 33250)
Location: 45.85025 N, 118.65739 W
Population (1990): 150 (55 housing units)
Area: 0.3 sq km (land), 0.0 sq km (water)
Zip code(s): 97835

Source: *U.S. Gazetteer, U.S. Census Bureau*

helix

helix: in CancerWEB's On-line Medical Dictionary

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